CONGENITAL PENILE CURVATURE

Epidemiology and physiopathology

- It is rare: the incidence is less than 1%
- Other reported that it is more common with prevalence rates of 4-10% in the absence of hypospadias .

There is no evident cause of congenital penile curvature.

On analysing the ultrastructure of the tunica albuginea it demonstrated

- widening and fragmentation of collagen fibres,
- complete disappearance of striation and transformation into electron-dense, fibrous, granulated material and elastin accumulation

Patient evaluation

- Physical examination during erection is only useful to document curvature and exclude other pathologies .
- Erectile function is normal but it can be compromised by excessive curvature.

Treatment

- the treatment of this pathology is only surgical.
- Plication techniques are used almost exclusively with high curvature correction rates (67-97%). The use of grafting material in isolated congenital penile curvature is too limited .

PEYRONIE'S DISEASE

Definition

It is a connective tissue disorder, characterised by the formation of a fibrotic lesion or plaque in the tunica albuginea, which leads to penile deformity.

Prevalence

0.4-9%

average age at onset = 53yrs

more common among couples that engage in more vigorous sex

Pathophysiology and natural history

- The aetiology of Peyronie's disease is unknown. An insult (repetitive microvascular injury or trauma) to the tunica albuginea is the most widely accepted hypothesis.
- intravasation of blood with activation of fibrinogen to fibrin , influx of macrophages, neutrophils, and mast cells thrombus forms leading to deposition of fibronectin + binding of growth factors
- TGF-1 is main growth factor involved in fibrosis & plaque formation matrix failure to down-regulate metalloproteinases may also be involved in abN scarring process and can lead to plaque formation
- Penile plaque formation can result in curvature which, if severe, may prevent vaginal intromission.

dorsal lesions are the most common

the histologic findings of Peyronie's plaques

1. non-polarized arrangement of collagen
2. haphazard arrangement of elastin
3. entrapped fibrin

Risk factors

- diabetes,
- hypertension,
- lipid abnormalities, i
- schaemic cardiopathy,
- erectile dysfunction,
- smoking,
- excessive consumption of alcohol
- Dupuytren’s contracture 9-39% of patients
- Younger men and Caucasian men are at increased risk for Peyronie’s disease after radical pelvic surgery, e.g. radical prostatectomy .

Phases of the disease

1) active inflammatory phase
    - often associated with pain in the flaccid state or painful erections } 33% have painless deformity
    - deformity still changing
    - it associated with and manifestation of a ‘soft’ nodule/plaque and penile curvature.
2) secondary quiescent phase “fibrotic phase”
    - disappearance of painful
    - characterized by formation of hard palpable that can be calcified
    - stabilization of deformity

With time, penile curvature is

- worsen in 30-50% of patients

- stabilise in 47-67% of patients,
- spontaneous improvement in 3-13% of patients .

symptoms

- Pain is present in 35-45% of patients during the early stages of the disease. Pain tends to resolve with time in 90% of men, usually during the first 12 months.
- penile curvature An improvement in penile curvature is more likely to occur in the early stage of the disease, rather than in a later phase when the plaque has been formed and become densely calcified .
- penile deformity
- palpable nodules (or indurated areas) in penis } most commonly on dorsal surface
- Erectile dysfunction is quite common (> 50%) in patients venogenic ED
- affected men also suffer significant distress.

Major attention should be given to whether the disease is still active, as this will influence medical treatment or the timing of surgery.

Clinical examination

Examination of the hands and feet for detecting possible Dupuytren’s contracture or Ledderhose scarring of the plantar fascia

Routine genitourinary assessment

1. Penile examination consists of a palpable node or plaque. Plaque size is measured in the erect penis
2. measure the penis dorsally from the base to the tip of the glans while at full stretch. Measurement of length during erection is important because it impacts directly on treatment decisions .
3. Girth-related changes are often self- reported by the patients.
4. Erectile function can be assessed using validated instruments such as the International Index of Erectile Function (IIEF) . it is important to define if Erectile dysfunction pre-dated or post-dated Peyronie’s disease onset.

5. An objective assessment of penile curvature with an erection is mandatory. This can be obtained by a home (self) photograph of a natural erection (preferably) or using a vacuum-assisted erection test or an intracavernosal injection using vasoactive agents.

Investigation

- Ultrasound (US) measurement of the plaque's size is inaccurate and operator dependent and it is not recommended
- Doppler US may be required for the assessment of vascular parameters. If consider surgery
- Plain x ray for calssification

Non-operative treatment

Indication

- in the early stage of disease. when symptoms are present and the plaque is not densely fibrotic or calcified
- in patients not fit for surgery
- when surgery is not acceptable to the patient.

The role of conservative treatment in men with stable/chronic disease has not yet been adequately defined.

It include

1. **Oral treatments**
   - Vitamin E
   - Potassium para-aminobenzoate (Potaba)
   - Tamoxifen
   - Colchicine
   - Acetyl esters of carnitine
   - Pentoxifylline

2. **Intralesional treatments**
    - Steroids
    - Verapamil
    - Clostridial collagenase
    - Interferon

3. **Topical treatments**
    - Verapamil
    - Iontophoresis
    - Extracorporeal shock wave lithotripsy (SWL)
    - Traction devices
    - Vacuum devices

1. **Oral treatment**

A. Potassium para-aminobenzoate (Potaba)

- It is an antifibrotic effect through
    - increase in oxygen uptake by the tissues,
    - a rise in the secretion of glycosaminoglycans,
    - an enhancement of the activity of monoamine oxidases
- does 12 g/day for 12 months
- adverse effect nausea, anorexia, pruritus, anxiety, chills, cold sweats, confusion and difficulty in concentration, but no serious adverse events were reported.
- may result in a significant reduction in penile plaque size and penile pain as well as penile curvature stabilisation.

B. Vitamin E

- It act as a natural antioxidant to reduce the number of oxygen-free radical
- once or twice daily doses of 400 IU

C. Tamoxifen

- It is a non-steroidal oestrogen receptor antagonist.
- It involves the modulation of TGFβ1 secretion by fibroblasts.
- Does 20 mg twice daily for 3 months
- Oral treatment with vitamin E and tamoxifen are not associated with significant reduction in penile curvature, plaque size or penile pain thus should not be used with this intent.

D. Colchicine

- It has anti-inflammatory effect
- Does 0.6-1.2 mg daily for 3-5 months
- adverse events gastrointestinal effects (nausea, vomiting, diarrhoea)

E. Acetyl esters of carnitine

- mechanism of action is unknown, it can reduce intracellular calcium levels in endothelial cells. This may suppress fibroblast proliferation and collagen production, thus reducing penile fibrosis.
- Does 1 g twice daily

F. Pentoxifylline

- It is a non-specific phosphodiesterase inhibitor which down regulates TGFβ1 and increases fibrinolytic activity also it increase of nitric oxide levels
- Does 400 mg three times daily for 6 months.
- oral treatments (acetyl esters of carnitine, pentoxifylline) are not recommended

G. Phosphodiesterase type 5 inhibitors “under investigation”

- they can reduce the collagen/smooth muscle and collagen III/I ratios and increase the apoptotic index in the Peyronie’s disease-like plaque
- daily tadalafil (2.5 mg for 6 months)

2. Intralesional treatment

A. Steroids

- It act by inhibition of phospholipase A2, suppression of the immune response and by decreasing
- Adverse effects include tissue atrophy, thinning of the skin and immune suppression.
- It is not associated with significant reduction in penile curvature, plaque size or penile pain. Therefore intralesional treatment with steroids cannot be recommended.

B. Verapamil

- Mechanism of action
  - It inhibit transport of extracellular matrix molecules, which included collagen, fibronectin, and glycosaminoglycans as it a calcium-dependent process,
  - increase in collagenase activity,
  - inhibit of fibroblast proliferation in the plaques
- (multiple-puncture technique, 10 mg of verapamil diluted to 10 mL, distributed throughout the plaque every 2 weeks for a total of 12 consecutive sessions)
- Side effects are uncommon (4%). Minor side effects include nausea, light- headedness, penile pain, and ecchymosis
- It may induce a significant reduction in penile curvature and plaque volume.

C. Clostridial collagenase

- It is a chromatographically purified bacterial enzyme that selectively attacks collagen,
- (three injections of clostridial collagenase 10,000 unit/0.25 cm3 per injection administered over 7-10 days and subsequently administered over 7-10 days at 3 months) has
- side effects were penile pain, contusions, and ecchymosis.
- It showed significant decreases in the deviation angle, plaque width and plaque length.

D. Interferon α-2b

- It decrease fibroblast proliferation, extracellular matrix production and collagen production from fibroblasts and improved the wound healing process
- (5×10^6 units of interferon α-2b in 10 mL saline, two times per week for 12 weeks)
- Side effects include myalgias, arthralgia, sinusitis, fever and flu-like symptoms.
- It may improve penile curvature, plaque size and density, and pain.
-

3. Topical treatments

A. Topical verapamil

- Itopical verapamil (gel 15% applied topically to the penile shaft twice daily)for 9 month
- It may improve penile curvature and plaque size.

B. Iontophoresis

- (also known as transdermal electromotive drug administration or electromotive drug administration [EMDA])
- It has been introduced to try and overcome limitations on the local uptake of the drugs themselves.
- Iontophoresis with verapamil 5 mg and dexamethasone 8 mg may improve penile curvature and plaque size.

C. Extracorporeal shock wave lithotripsy

- The mechanism of action is still unclear, but there are two hypotheses.
    - shock wave therapy works by directly damaging and remodelling the penile plaque.
    - SWL increases the vascularity of the area by generating heat resulting in an inflammatory reaction, with increased macrophage activity causing plaque lysis and eventually leading to plaque resorption.
- four weekly treatment sessions of SWL, with each session consisting of 2000 focused shock waves.
- Extracorporeal shock-wave treatment fails to improve penile curvature and plaque size, and should not be used with this intent but may be beneficial for penile pain.

D. Traction devices

- It increases the activity of degradative enzymes. This initially leads to a loss of tensile strength and ultimately to solubilisation. It is followed by an increase in newly synthesised collagen
- Penile Extender was applied as the only treatment for 2-8 hours/ day for 6 months)
- There were no adverse events, including skin changes, ulcerations, hypoesthesia or diminished rigidity.

E. Vacuum devices

- It mechanism of action as traction devices.
- vacuum device is used for 10 min twice daily over a 12 week period.
- Penile traction devices and vacuum devices may reduce penile deformity and increase penile length.

Surgical treatment

The aim of surgery is to correct curvature and allow satisfactory intercourse

Surgery is indicated when Peyronie's disease is stable for at least 3 months (without pain or deformity deterioration).

Types of repair

1. penile shortening
2. penile lengthening
3. penile prosthesis implantation

1- Penile shortening procedures

Nesbit operation

- It include removal of tunical ellipses opposite a non-elastic corporal segment
- It is based on a 5-10 mm transverse elliptical excision of the tunica albuginea or approximately 1 mm for each 10o of curvature (104).
- Advantage
    - High sucesss rate complete penile straightening is achieved in 80%.
    - Recurrence of the curvature and penile hypoesthesia are uncommon (about 10%)
    - Minimal risk of postoperative erectile dysfunction
- Disadvantage
    - High incidence of penile shortening 85% of patients.
- Only one modification of the Nesbit procedure has been described (partial thickness shaving
- instead of conventional excision of a wedge of tunica albuginea).

Plication procedures "Nesbit modifications"

- It actually share the same principle as the Nesbit operation but are simpler to perform.

- They are based on single or multiple longitudinal incisions on the convex side of the penis closed in a horizontal way, applying the Heineke- Miculicz principle, or plication is performed without making an incision.
- use of non- absorbable sutures reduced recurrence of the curvature. Results and satisfaction rates are similar to the Nesbit

‘16 dot’ technique with minimal tension under local anaesthesia

2- Penile lengthening procedures

Tunical lengthening procedures include an incision in the short (concave) side of the tunica to increase the length of this side, creating a tunical defect, which is covered by a graft.

Disadvantages

- High erectile dysfunction rates 25%.
- re-operation rate 17% due to graft contracture and long-term failures
- plaque removal is associated with high rates of postoperative erectile dysfunction due to venous leak.

Poor prognostic factors for functional outcome after grafting surgery

- The presence of pre-operative erectile dysfunction,
- the use of larger grafts,
- age more than 60 years,
- ventral curvature

Types of grafts used in Peyronie’s disease surgery

Autologous grafts

- Dermis
- Vein grafts
- Tunica albuginea
- Tunica vaginalis
- Temporalis fascia
- Buccal mucosa

Allografts

- Cadaveric pericardium
- Cadaveric fascia lata
- Cadaveric dura matter
- Cadaveric dermis

Xenografts

- Porcine small interstinal submucosa
- Bovine pericardium
- Porcine dermis

Synthetic grafts

- Gore-Tex
- Dacron

Vein grafts

- Advantage endothelial-to-endothelial contact when grafted to underlying cavernosal tissue.
- Saphenous vein is the most common vein used, followed by dorsal penile vein.
- Postoperative curvature (20%), penile shortening and graft herniation (5%).

Tunica vaginalis

- Advantage It is relatively avascular, easy to harvest and has little tendency to contract

Dermal grafts

Disadvantages commonly associated with contracture resulting in

- recurrent penile curvature (35%),
- progressive shortening (40%),
- a 17% re-operation rate at 10 years .

Cadaveric pericardium (Tutoplast®)

It has good results by coupling excellent tensile strength and multi-directional elasticity/expansion

Small intestinal submucosa (SIS) a

- It is a collagen-based xenogenic graft derived from the submucosal layer of the porcine small intestine)
- it promote tissue-specific regeneration, and supports the growth of endothelial cells.
- Small intestinal submucosa acts as a scaffold to promote angiogenesis, host cell migration and differentiation, resulting in tissue structurally and functionally similar to the original.
- It has been used successfully to repair severe chordee and Peyronie's disease, without significant contraction or histological alterations

3- Penile prosthesis

Indication

- Peyronie's disease in patients with erectile dysfunction, especially when they are not responders to phosphodiesterase type 5 inhibitor (PDE5I).

In cases of severe deformity, intra-operative 'modelling' of the penis over the inflated cylinders (manually bent on the opposite side of the curvature for 90 seconds, often accompanied by an audible crack) has been introduced as an effective treatment.

If there is a residual curvature of less than 30º, no further treatment is recommended, as the prosthesis will act as a tissue expander and will result in complete correction of curvature in a few months. While this technique is effective in most patients, a Nesbit/ plication procedure or plaque excision/incision and grafting may be required in order to achieve adequate straightening.

The risk of complications is not increased compared to the general population. However, a small risk of urethral perforation (3%) has been reported in patients with ‘modelling’ over the inflated prosthesis

To summarize

For Choosing the most appropriate surgical intervention is based on

- penile length assessment,
- curvature severity
- erectile function status, including response to pharmacotherapy in cases of erectile dysfunction]

A. Tunical shortening procedures, especially plication techniques are the first treatment options for
   - congenital penile curvature
   - Peyronie’s disease with
     - adequate penile length,
     - curvature < 60o
     - absence of special deformities (hour-glass, hinge).

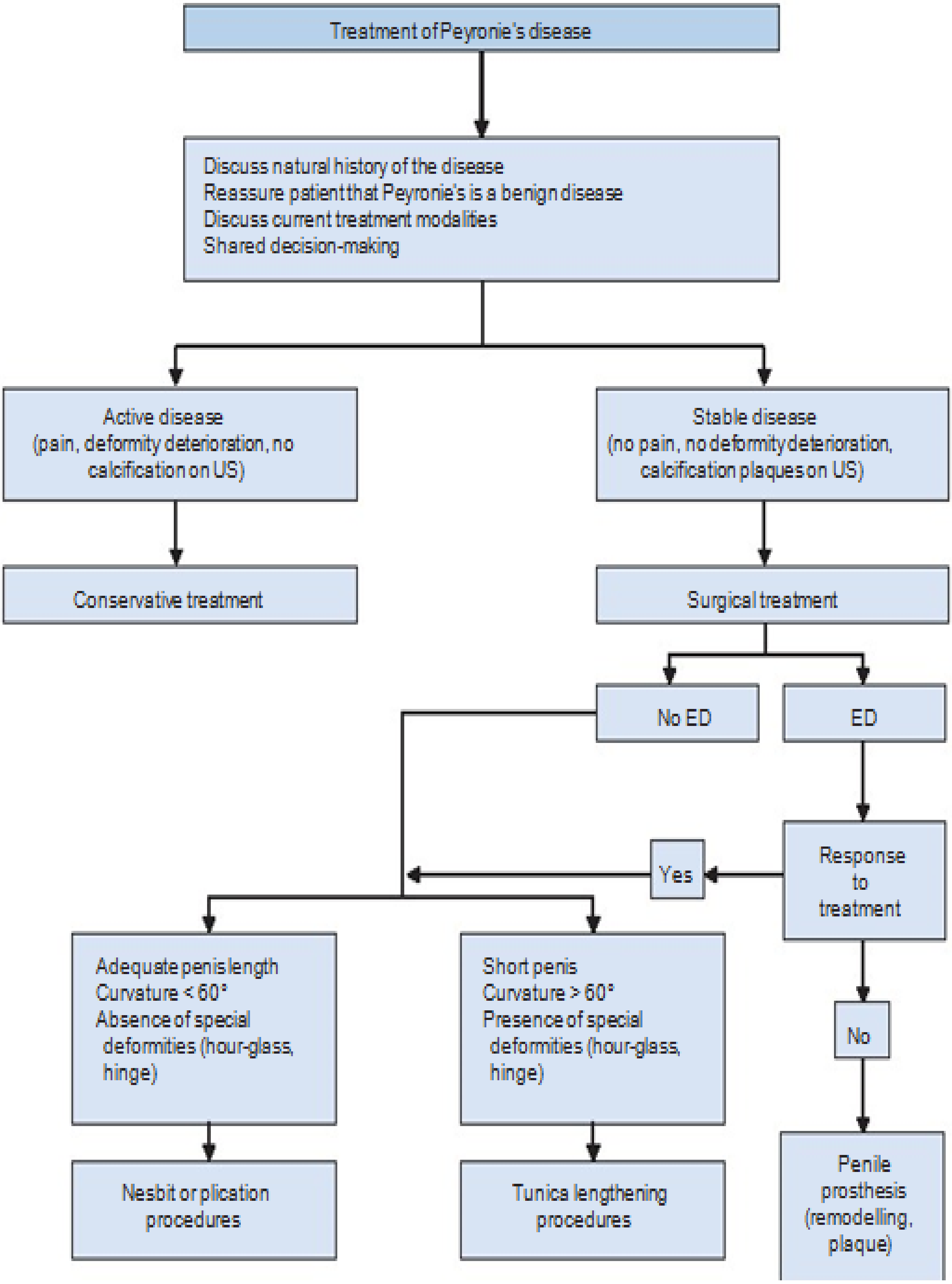
B. Grafting techniques are the preferred treatment option for patients with Peyronie’s disease with
   - no adequate penile length,
   - curvature > 60º
   - presence of special deformities (hour- glass, hinge).
   - with a good erectile function (with or without pharmacological treatment)

C. Penile prosthesis implantation, with or without any additional procedure (modelling, plication or grafting), is recommended in Peyronie’s disease patients with erectile dysfunction not responding to pharmacotherapy.

Risks of surgery should be discussed with the patient

- penile shortening,
- erectile dysfunction, seems to be greater for penile lengthening procedures
- penile numbness, it is due to neuropraxia of dorsal neurovascular bundle during mobilization
- palpation of knots and stitches underneath the skin.

- recurrent curvature, it is either due to
  - failure to wait until the disease has stabilised,
  - reactivation of the condition following the development of stable disease,
  - the use of re-absorbable sutures that lose their strength before fibrosis has resulted in acceptable strength of the repair .


Treatment of Peyronie's disease
Discuss natural history of the disease
Reassure patient that Peyronie's is a benign disease
Discuss current treatment modalities
Shared decision-making
Active disease
(pain, deformity deterioration, no calcification on US)
Stable disease
(no pain, no deformity deterioration, calcification plaques on US)
Conservative treatment
Surgical treatment
No ED
ED
Response to treatment
Yes
No
Adequate penis length
Curvature < 60°
Absence of special deformities (hour-glass, hinge)
Short penis
Curvature > 60°
Presence of special deformities (hour-glass, hinge)
Nesbit or plication procedures
Tunica lengthening procedures
Penile prosthesis (remodelling, plaque)

the important steps of excision + dermal graft procedure for Peyronie’s disease.

- incision } dependent on location of lesion
  - ventral plaques } midline incision of ventral aspect of penis
  - dorsal plaques } circumferential incision
  - previous circ } use old circ scar
- deglove penis to its base
  - proximal plaques } 2nd incision on scrotum, lateral to base of penis
    } lay skin aside, cover w/ warm sponge
- elevate dorsal NVB w/ Buck's fascia
  - incise just lateral to spongiosum, w/ Buck's and dorsal NVB dissected off lateral and dorsal corpora cavernosa
  - alternative } dissect sharply through bed of deep dorsal vein, perform modified vein dissection
- artificial erection to define curvature
- place Prolene stay sutures in midline, proximal, and distal to plaque
- mark incision
  - if excision of plaque planned, incise tunica laterally to convert corporotomy defect from ovoid to stellate
  - releases tightness of defects edges
- excise plaque
  - measure defect } stretch penis to ensure adequate coverage
- graft harvest
  - dermal graft outlined on donor site
  - graft site de-epithelialized, defat dermal graft
  - tailor graft to measure 30% larger in all dimensions
- grafting
  - complete closure w/ 3-0 PDS, perform another artificial erection, oversew leaks
  - close penis, reappose Buck's w/ PDS
  - small suction drains
- alternative } H incision
  - flaps allowed to slide, leaving approximately square defect

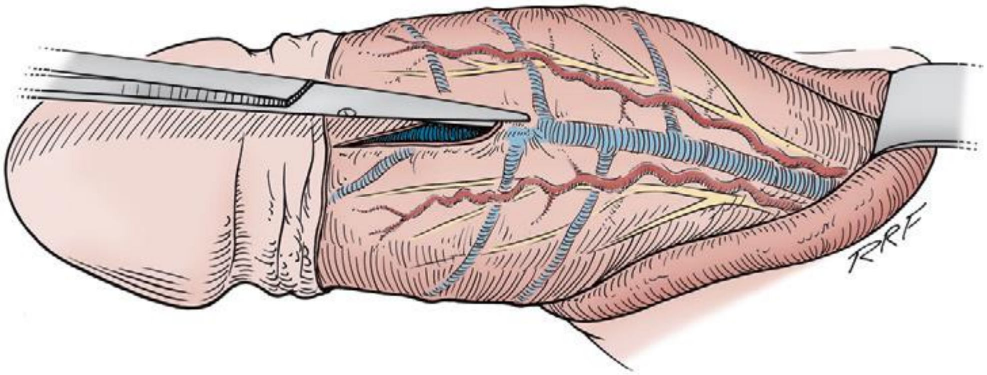
- graft sutured onto defect

 penis covered w/ Bioclusive dressing, mildly compressive Kling (x4h)

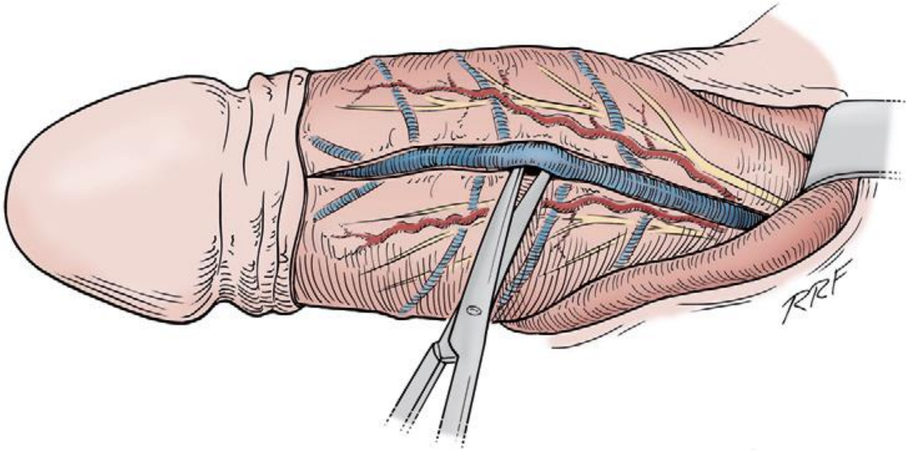
- check glans q30min x 4h

 Post-op

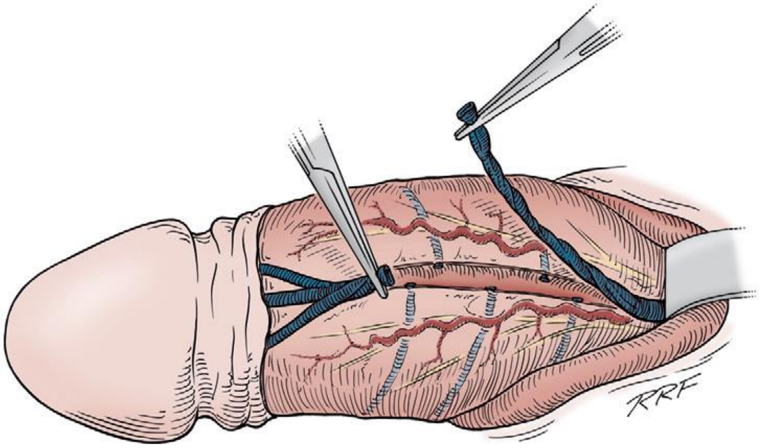
- Foley x 1d
- remove drains
- initially suppress erections w/ Valium and amyl nitrate
     after 2 weeks, encourage pts to have erections, but not sex
- manipulate penis to prevent adherence of tissue
- use vacuum device



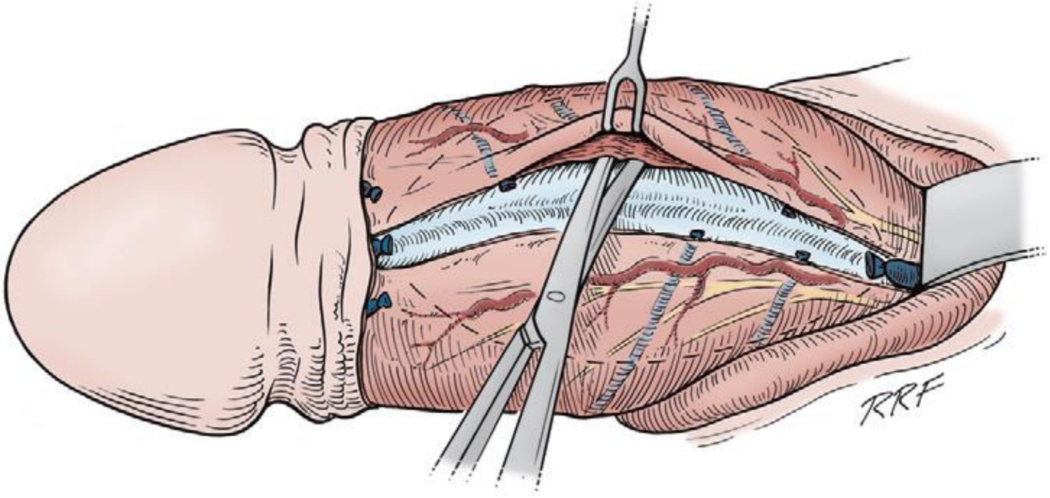
The skin has been degloved to the base of the penis by dissection in the layer immediately superficial to the Buck fascia. An incision in the dorsal midline of the Buck fascia exposes the deep dorsal vein. The coiled dorsal arteries and the circumflex veins are demonstrated.



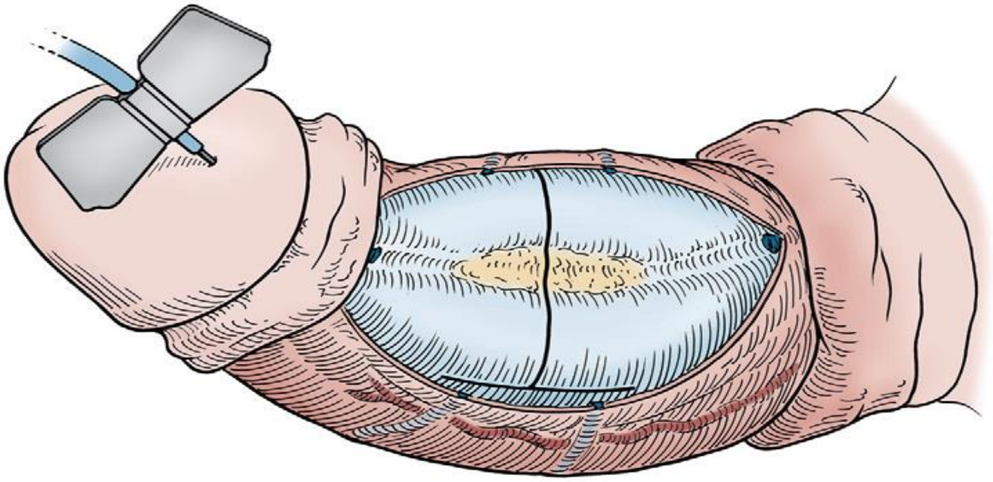
The deep dorsal vein is mobilized



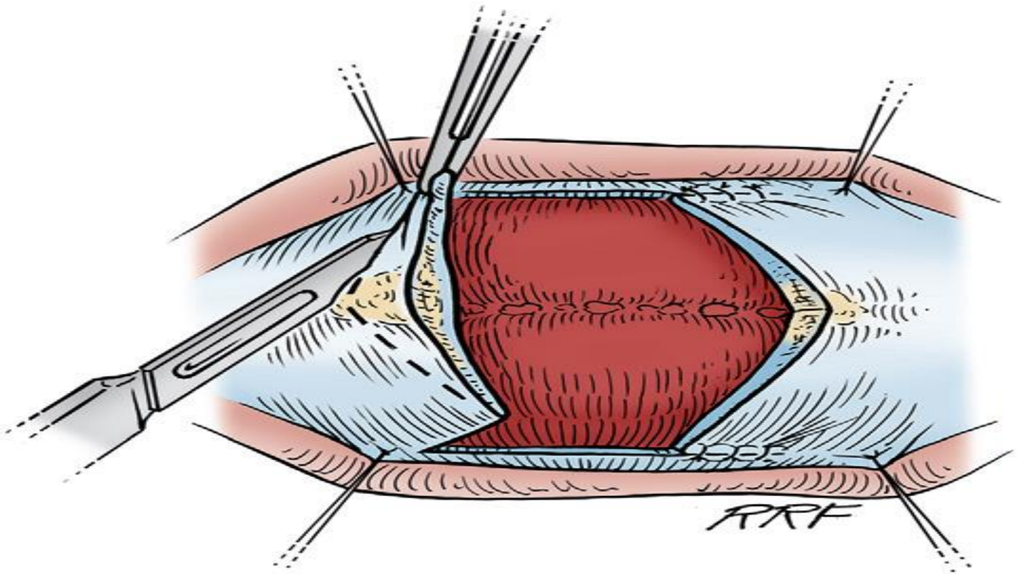
The dorsal vein is ligated

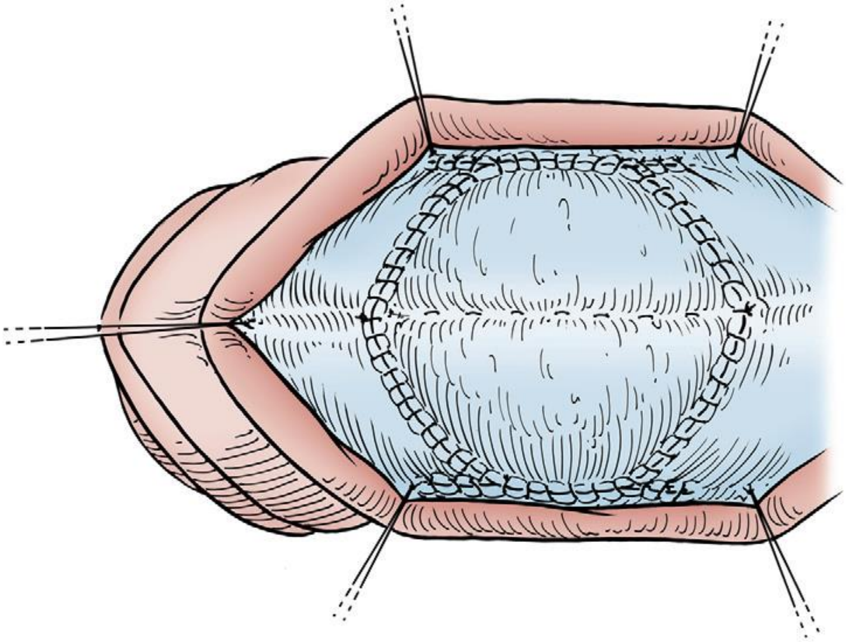


Buck fascia is elevated from the Peyronie’s plaque. The area of dissection is outlined by the *dashed line*, continued far enough proximally, distally, and laterally to allow excision of the plaque without distraction or stretching of the nerves in the fascia.



An H-shaped incision is marked at the site of maximal curvature





The flap positiond in place

Priapism

DEFINITION and EPIDEMIOLOGY

unwanted, prolonged penile erection w/o sexual stimulation or excitement

~1 case per 100, 000 person-yrs

much more common in certain populations } sickle cell disease intracavernosal injections

ETIOLOGY

□ primary (idiopathic) } may account for ~50%

□ secondary

1) **T**hromboembolic
   - Sickle cell disease
   - Leukemia } 50% of patients with chronic granulocytic leukemia
   - Asplenism
   - TPN with ≥20% fat emulsion
   - Epo use
2) **I**atrogenic
   - IC injection Rx } more common in younger patients and those with neuro disease
   - intraurethral alprostadil
3) **N**eurologic conditions
   - syphilis
   - SCI or brain injury
   - spinal anesthetic
   - brain tumours
   - lumbar disk herniation
   - epilepsy
4) **T**rauma
   - direct penile and perineal trauma
5) **I**nfections
   - malaria, rabies, scorpion bites
6) **N**eoplasms
   - penile
   - prostate
   - kidney
   - bladder
   - urethral
   - rectosigmoid

7) **M**eds

- anti-HTNsives (hydralazine, □-blockers) -
- anti-psychotics (clozapine)
- anti-depressants (SSRIs, trazadone)
- androgens
- anticoagulants (heparin, coumadin)
- antihistamines (hydroxazine)
- alcohol + cocaine
- tranquilizers
- tacrolimu

NATURAL HISTORY

- either permanent resolution or progression to recurrent episodes +/- ED
- after resolution of episode of ischemic priapism, can have some penile edema and some enlargement may persist
- without effective treatment, ischemic priapism will eventually resolve with time,
  although permanent damage of the penis can be expected
  □ ~90% of those with priapism >24hrs will have permanent ED
- non-ischemic priapism may persist unresolved for extended periods of time if not treated and erectile function usually preserved
- sicklers and idiopathic priapism represent most with recurrent priapism

PATHOLOGY

histopathologic features of ischemic priapism

- penile tissue necrosis & progressive fibrosis are the end-stage manifestations
- smooth muscle contractile dysfunction results
    - hypoxia, acidosis, glucopenia, hypercapnia, increased metabolic acid products at 4hrs
    - trabecular interstitial edema after 12 hrs
    - sinusoidal endothelial denudation with adherence of thrombocytes to exposed BM after 24 hrs
    - formation of thrombi in sinusoidal spaces with necrosis of smooth muscle cells after 48 hrs
    - reperfusion injury also occurs after resolution due to oxidative stress
    - NO thrombi form despite intracorporal blood stasis due to increased fibrinolytic activity in the penis relative to systemic circulation
- irreversible damage starts at ~4hrs

PATHOPHYSIOLOGY

- ischemic
    - veno-occlusion } vascular stasis with decreased venous outflow due to mechanical factors (eg sickle cell), local viscosity changes (eg IHD), and increased local coagulability (eg TPN)
- non-ischemic
    - unregulated blood inflow } traumatic disruption of penile vasculature with fistula formation b/w cavernous artery and lacunar spaces of cavernous tissue
- dysregulatory hypothesis } dysfunctional determinants of corporal smooth muscle responses

CLASSIFICATION

1) ischemic priapism } low-flow priapism
    - little or absent intracorporal blood flow } compartment syndrome of penis
    - get characteristic metabolic changes & excessive pressure increases localized to corpora cavernosa
    - typically presents WITH PAIN, rigid corpora cavernosa
    - glans & corpus spongiosum are usually not engorged
    - ABG of cavernous bodies show hypoxia, hypercapnia, and acidosis
2) non-ischemic priapism } high-flow priapism
    - features elevated vascular flow through the corpora cavernosa
    - most frequently associated with penile or perineal trauma
    - typically presents WITHOUT PAIN and corpora cavernosa are not usually fully rigid
    - ABG of cavernous bodies does not reveal hypoxia or acidosis
3) recurrent “stuttering” priapism
    - variant of ischemic priapism
    - most commonly seen with sickle cell disease
4) refractory priapism
    - non-ischemic erectile state that occurs immediately after treatment of ischemic priapism
    - due to rapid arterial blood filling after surgical treatment
5) neurogenic priapism
    - neurologic disorders causing disturbances in neuroregulation of penile erection at central or peripheral nervous system levels
    - fits both ischemic & non-ischemic priapism
6) idiopathic priapism
    - tends to be ischemic
7) drug-induced priapism
    - fits both ischemic & non-ischemic priapism

DIAGNOSIS

1) hx and P/E } pain, duration, previous episodes, previous treatment, PMHx, meds, ICI
   } penis, DRE, abdo exam, neuro exam
2) Lab tests } CBC, sickle cell screen, serum & urine toxicology, penile ABG
3) imaging } should not delay treatment
   } color duplex U/S, penile arteriography
      penile arteriography only used as part of embolization, NOT DIAGNOSTIC

penile ABG findings of priapism?

- ischemic } PO2 <30 mmHg, PCO2 >60 mmHg, pH <7.25
- non-ischemic } PO2 >90 mmHg, PCO2 <40 mmHg, pH ~7.4

 normal flaccid penis ABG is equal to normal mixed venous blood at room air

  - PO2 ~40 mmHg, PCO2 ~50mmHg, pH ~7.35

findings on color duplex U/S of priapism

 must be done in lithotomy or frog-leg position } scan perineum and then entire penile shaft

- ischemic } minimal or absent blood flow in cavernosal arteries and within corpora cavernosa
- non-ischemic } normal to high blood flow in cavernosal arteries and evidence of blood flow in corpora cavernosa
  } may also see cavernous arterial fistula or pseudoaneurysm that helps confirm the diagnosis of non-ischemic priapism

TREATMENT

treatment algorithm for priapism

1) Hx, P/E, ABG
    - □ ischemic vs non-ischemic
    - □ isolated vs stuttering
2) if stuttering
    - □ anti-androgens, self-injection with phenylephrine, baclofen, digoxin, etc
3) if ischemic
    - a) aspiration +/- irrigation } simultaneous treatment of underlying cause (eg sickle cell)
    - b) phenylephrine
    - c) distal shunting
    - d) proximal shunting
    - e) penile prosthesis
4) if non-ischemic
    - a) observation
    - b) arteriography and embolization
    - c) surgical ligation

Ischemic Priapism

1- **non-surgical management options for ischemic priapism**

□ IF AN UNDERLYING ETIOLOGIC DISORDER EXISTS, CONCURRENT SYSTEMIC TREATMENT SHOULD BE PROVIDED BUT DON'T DELAY SPECIFIC MGT

eg. Hydration, oxygenation, analgesia, exchange transfusion for sickle cell disease

1) aspiration +/- irrigation
   - place dorsal nerve block or local penile shaft block
   - use 16- or 18-gauge needle
   - transglanular intracorporal needle insertion may be best
     - □ lessens formation of penile hematoma
     - □ may facilitate drainage of blood into corpus spongiosum
   - maximal irrigation of corporal bodies done with patient in lithotomy and placement of needles into corpora cavernosa distally and proximally at penile crura

   □ RESOLVES PRIAPISM IN ~30%

2) intracavernous injection of □-adrenergic sympathomimetics agents
   - evacuate stagnant blood prior to injection
   - phenylephrine is preferred □-selective adrenergic agonist
     - □ minimal risk of cardiovascular side effects
   - 100-500 µg q5-10 mins until detumescence (MAX 1000□g)
   - monitor for S/E's such as HTN, tachycardia, H/A, reflex bradycardia, palpitations, arrhythmias
     - □ **BP and ECG monitoring recommended in patients w/ high CV risk**

   □ RESOLVES PRIAPISM IN ~60%

   □ UNLIKELY TO RESOLVE IF PRIAPISM DURATION >48-72 HRS

2- surgical managment

A. DISTAL SHUNTS

□ corporoglanular shunts

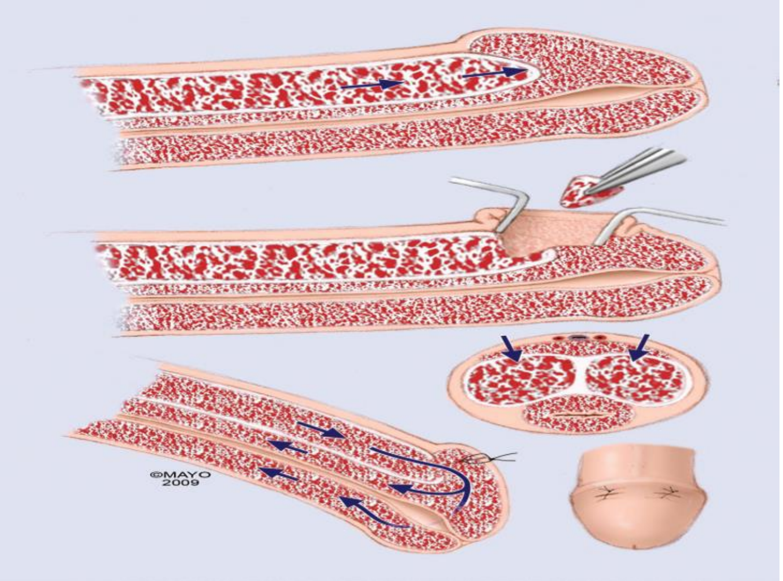
1) Winter } Bx needle into glans through tunica albuginea into corpus spongiosum

2) Ebbehoj } scalpel blade

3) El-Ghorab } transglanular incision with excision of tips of corpus cavernosum excision of circular cone segments of the distal tunica albuginea (5 × 5 mm).

} creates shunt between corpora cavernosa and glans

} most effective distal shunt it is used aftr failed percutaneous one



B. PROXIMAL SHUNTS

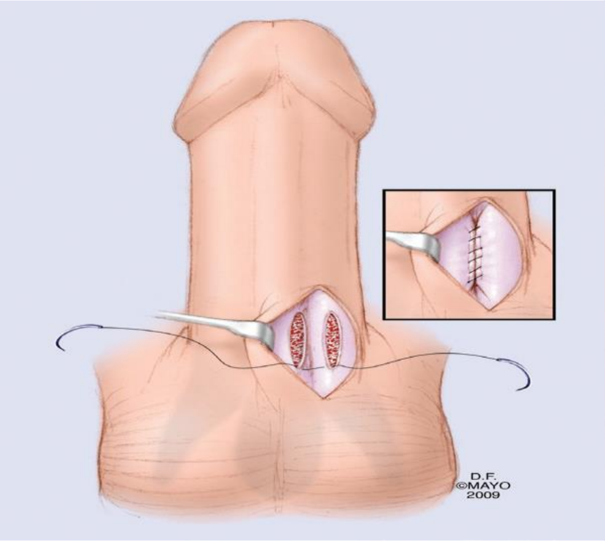
1) Quackel } creation of window between **corpus cavernosum & corpus spongiosum**

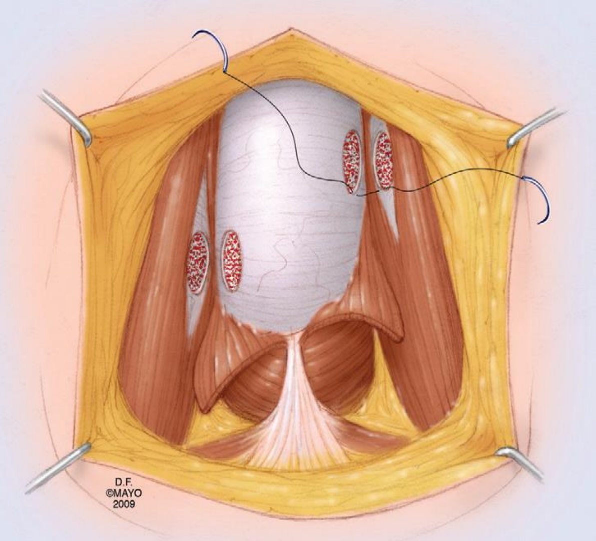
} corporospongiosal shunt

} placed between urethral bulb and crura via perineal approach

□ avoid penile approach due to risk of urethral injury

} Sacher = bilateral Quackel The right and left sides are separated by a distance of at least 1 cm in an effort tominimize the risk of urethral stricture



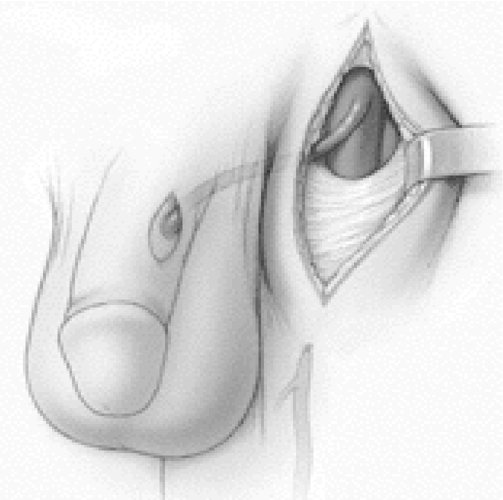


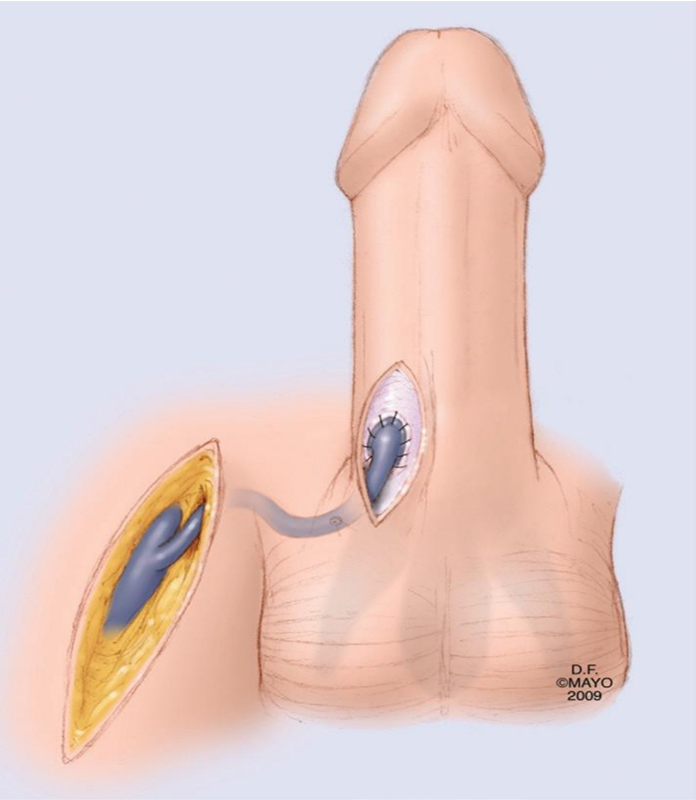
2) Grayhack } anastomosis of **saphenous vein** to one of the corpora cavernosa

} incision made 3-4cm below inguinal ligament and vein mobilized for 10cm

} dissect subcutaneously to corpora and pass ligated vein

} high risk of PE



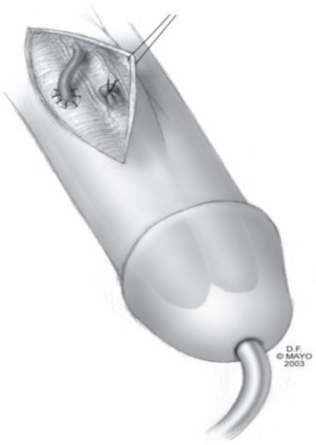


3) Barry } caverno-dorsal shunt

} **superficial & deep dorsal veins** to corpora cavernosum

 most shunts tend to close in time

 persistence of a shunt may be a cause of ED } length of priapism may contribute to ED



Deep dorsal vein (DDV) shunt with distal ligation of DDV and anastamosis of proximal DDV to corpus cavernosum. A wedge of tunica albuginea is removed

complications of surgical shunts

- hematoma
- pain
- scarring
- urethral fistulas
- purulent cavernositis
- PE (reported after Grayhack)

C. penile prosthesis

- delayed ischemic priapism will likely fail even proximal shunting and ED is likely inevitable
- immediate placement of prosthesis is advocated for several reasons;
    1) later Sx after fibrosis has evolved is very difficult and has higher complication rate
    2) these patients commonly do not respond to even ICI

Non-ischemic Priapism

1) Observation
    - **recommended initial management**
    - spontaneous resolution occurs in ~60% of cases
2) selective arterial embolization
    - nonpermanent } autologous clot, absorbable gels
    - permanent } coils, ethanol, polyvinyl alcohol particles, acrylic glue
    - □ similar success rates
    - □ resolves non-ischemic priapism in ~75%
    - □ non-permanent preferred due to lower ED rate (5% vs 40%)
3) penile exploration and direct surgical ligation
    - ligation of sinusoidal fistulas or pseudoaneurysms using intra-op color duplex U/S
    - □ resolves non-ischemic priapism in ~65%
    - □ causes ED in up to 50%

Recurrent "stuttering" Priapism

□ treat acute presentations as ischemic priapism to prevent other attack

1) **Viagra** 25mg od
2) **T**erbutaline (□-agonist)
3) **A**nti-androgens
    - □ **primary recommendation } should not be used in prepubescent boys**
    - □ **most consistently successful**
    - Leuprolide (7.5mg im qmonthly)
    - bicalutamide (50mg od)
    - flutamide (250mg tid)
    - 5 ARIs
4) **M**ethylene blue
    - for non-ischemic priapism
5) **E**strogen

6) **D**igoxin (0.5mg od)
    - cardiac glycoside } anorexia, N/V, blurred vision, H/A, gynecomastia

7) **H**ydroxyurea
    - in sickle cell patients

8) **I**ntracavernous self injections of phenylephrine

9) **S**treptokinase and tPA
    - for ischemic priapism

10) **B**aclofen (20-40mg qHS)
    - □-aminobutyric acid antagonist
    - potential role for “neurogenic” priapism

potential treatments being studied in the management of priapism

- reduction of pathologic changes } antioxidant therapy
- prevention of pathophysiologic mechanisms } PDE5 regulators

manifestations of sickle cell disease/trait.

- **H**ematuria (dysmorphic RBCs) } M > F and L side 4x more than R
- **U**TIs
- **G**lomerular disease (MPGN, immune complex GN, etc) } leads to proteinuria
- **E**D
- **F**requency, polyuria, etc (Nephrogenic DI)
- **N**octurnal enuresis
- **P**riapism
- **R**TA (distal)
- **I**nfertility
- **A**RF
- **P**apillary necrosis
- **I**nfarcts (renal medulla, testicular)
- **S**low (chronic) renal failure

- **M**edullary RCC (trait